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ABSTRACT

During adolescence, students become increasingly vulnerable to academic underperformance caused by negative reactions to their awareness of ability impugning stereotypes about one's group, a phenomenon known as stereotype threat. Although stereotype-related underperformance can occur early in development, it is during adolescence that it is seen most consistently, due to the development of social-cognitive and metacognitive abilities coupled with the social climate beginning with the transition to middle or junior high school. This chapter describes stereotype threat and traces research findings showing how these consequences can include lower academic performance both for minority groups on tests that include cognitive tasks and for women in male-oriented domains such as mathematics. Research is described showing that vulnerability to stereotype threat is most pronounced in situations that are evaluative or that direct conscious attention to one's stereotyped status, both present in standardized testing situations. The chapter also describes research that examines the development of sex and racial stereotyping in children, identity development, development of ability conceptions, and social-cognitive and metacognitive development. Various ways in which individuals can be affected by stereotypes alleging intellectual inferiority are discussed. The role of implicit theories of intelligence in reducing stereotype threat is considered, and evidence is presented that holding an incremental theory of intelligence provides an effective defense against the negative effects of stereotype threat. (Contains 122 references.) (KB)

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CHAPTER 11

THE DEVELOPMENT AND CONSEQUENCES OF STEREOTYPE VULNERABILITY IN ADOLESCENTS

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Adolescence is often described as time of storm and stress. It is described this way by parents, teachers, the popular media, and by adolescents themselves. These accounts arise, in part, from the salience, intensity, and rapidity of the cognitive, social, and physical changes associated with this period in life. It is during adolescence, after all, when one is most likely to experience acne, depression, eating disorders, and thoughts of suicide (Birmaher, Ryan, Williamson, Brent, & Kaufman, 1996; Condit, 1990; Larson & Ham, 1993; Rutter & Garmezy, 1983). Research suggests the turmoil associated with adolescence is, to some degree, exaggerated (e.g., Holmbeck & Hill, 1988; Males, 1996). Yet it is quite clear that adolescents face many difficult challenges, arising not only from maturational changes but also from transitions to new and more difficult environments. Many such challenges have consequences for academic achievement. In this chapter we discuss what research findings suggest is a significant factor for minority adolescents and girls in many situations—contending with stereotypes that allege some sort of intellectual or academic inferiority.

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During adolescence, students become increasingly vulnerable to academic underperformance caused by negative cognitive, behavioral, and emotional reactions to awareness of ability impugning stereotypes about one's group, a phenomenon known as "stereotype threat." By the time individuals reach late adolescence (ages 18 to 21), ability-related stereotypes, such as those about African American's intellectual skills and females' math skills, become meaningful enough to disrupt performance on standardized tests. The existing research—much of which is preliminary—suggests that stereotype-related underperformance can occur quite early in development. Yet it is during adolescence that it is seen most clearly, acutely, and consistently. This is due both to the development of social-cognitive and metacognitive abilities that occur during adolescence, coupled with the social climate that begins when young adolescents transition to middle or junior high school. These factors combine, we believe, to create an environment of unnerving expectations that for many minority students has long-term consequences for their educational outcomes and contribute to a depressing trend of underachievement for women in math and science domains, and for blacks and Latinos across the academic board. We turn now to a description of this trend.

ACADEMIC ACHIEVEMENT OF MINORITIES AND FEMALE STUDENTS

The academic underperformance of black and Latino students and the underrepresentation of girls and women in mathematics and science domains are long-standing concerns among developmental psychologists and anyone concerned with educational inequities. Each year, fresh statistics from statewide and national tests and national surveys replicate the troubling pattern of underachievement noted for as long as records have been kept. For example, black students underperform on most measures of achievement from grade school through college. Compared to white and Asian students, black students receive lower grades, obtain lower scores on tests of reading, math, and science, and have higher dropout rates (Jencks & Phillips, 1998; National Center for Education Statistics, 2000). Although the black–white gap has narrowed since the 1970s, the average Black student still scores below 75% of white students on most standardized tests (Jencks & Phillips, 1998). Hispanic students fare somewhat better, but their test and school performance tends also to lag substantially behind that of white and Asian students (see Romo & Falbo, 1995). What is more troubling is that these disparities persist even after differences in socioeconomic factors are taken into account (Warren, 1996).

A similar yet distinct pattern exists for girls and young women in the areas of math and science. Although most studies find no gender gap in math performance until about Grade 8 (National Center for Education Statistics, 2000), girls' enjoyment and confidence in math tends to be measurably lower than boys' as early as elementary school—despite equal performance. Over time in school, the gender gap in confidence increasingly is accompanied by actual performance differences. For example, scores on the Third International Mathematics and Science Study (TIMSS), an achievement test given to half a million students in Grades 4, 8, and 12 in 41 nations, reveals a gender gap that widens with age; by Grade 12, boys significantly outscore girls. Behavioral changes also become more pronounced over time, with girls being significantly less likely than boys to enroll in the more advanced math and science courses (American Association of University Women, 1992, 1998). Furthermore, girls who do pursue an advanced math course are more likely to drop out before finishing the course (Hanson, 1996; Stumpf & Stanley, 1996). Results of this trend are quite clear at the graduate and professional levels, where women received only 22% of the mathematics doctorates and a mere 9% of mathematics professorships.

Much psychological and educational research has examined the various factors presumed to underlie these gaps. For example, researchers have identified specific sociological processes that impede the achievement of Black students (e.g., Jencks & Phillips, 1998), of Hispanic students (e.g., Romo & Falbo, 1995; Valencia, 1997), and of girls and women in math and science (e.g., Congressional Hearing, 1994; Eccles & Jacobs, 1992; Sadker & Sadker, 1994). Recent research in social psychology has suggested the operation of a more general process that may systematically contribute to the underachievement of students in these groups (Aronson et al., 1999; Aronson, Quinn, & Spencer, 1998; Spencer, Steele, & Quinn, 1999; Steele, 1997; Steele & Aronson, 1995; Steele, Spencer, & Aronson, 2002). This research suggests that individuals suffer negative performance outcomes—lower test scores and less engagement with and less enjoyment of academics—because they are burdened by an uncomfortable awareness of cultural stereotypes impugning their intellectual and academic abilities. Steele and Aronson (1995) called this burden "stereotype threat," and established in their laboratory experiments with Black adolescents (college freshmen and sophomores) a link to substantial decrements in standardized test performance. Subsequent experimental work has established that stereotype threat also undermines the academic performance of students from low socioeconomic backgrounds (Croizet & Claire, 1998) and females in math (Inzlicht & Ben-Zeev, 2000; Spencer et al., 1999). The view emerging from this research is that underperformance occurs because stereotypes facilitate pejorative interpretations of failure or academic difficulty, suggesting

low ability rather than surmountable challenges. This adds stress and self-doubt to the educational experience and uneasiness about not belonging in the academic arena. Ultimately, stereotype threat can undermine the degree to which students value academic achievement, an effect that appears to accumulate over time (Aronson et al., 2002; Osborne, 1995; Steele, 1997).

Researchers have learned much about the stereotype threat process as it affects adolescents in college (see Aronson, 2002; Steele et al., 2002, for reviews). Yet relatively little is known about the development of vulnerability to stereotype threat—when and under what conditions children and adolescents become meaningfully affected by ability-relevant stereotypes about the groups to which they belong. Although even young children are aware of and use stereotypes, the age that negative ability stereotypes influence performance has received little attention. Are children susceptible to negative stereotypes about their intellectual abilities? If so, at what age and under what circumstances does their awareness of negative ability stereotypes become disruptive to their achievement? Does the stereotype threat process work in the same way for children and early adolescents as it does for older adolescents?

STEREOTYPE THREAT IN LATE ADOLESCENCE

As Gordon Allport (1954) noted nearly 50 years ago, "one's reputation, whether true or false, cannot be hammered, hammered, hammered, into one's head without doing something to one's character" (p. 142). Although Allport was referring to the direct effects of stereotypes and prejudice on personality, research increasingly shows that stereotypes have consequences both for achievement and for academic self-concept. For example, the findings of Steele, Aronson, and their colleagues suggest that mere awareness of negative stereotypes in stereotype-relevant situations is sufficient to undermine the academic performance of individuals to whom the stereotype applies. Since the initial publication of studies on stereotype threat, researchers have examined many issues surrounding this important construct. For example, they have found that virtually any group to which ability stereotypes apply can experience stereotype threat. As noted, stereotype threat effects have been found among African American and Latino students, females on math tests, and students of low socioeconomic status on general achievement tests.

Researchers also have identified individual risk factors that increase one's vulnerability to stereotype threat—their "stereotype vulnerability" (Aronson, 2002). One clear factor—at least in laboratory research—is "domain identification," the degree to which one values achievement in a

given academic domain as a personally defining construct. The higher the domain identification, the more one is bothered by implications of inferiority in that domain. And thus, underperformance due to stereotype-related stress is most pronounced for those who value and care about doing well in the stereotyped domain (Aronson et al., 1999; Aronson & Good, 2001). Other personal factors that influence stereotype vulnerability include racial or gender identification, expectations for being discriminated against, and beliefs about the nature of intelligence (see Aronson, 2002, for a review). These vulnerability factors, however, may be less influential than the situational factors that have been shown to induce stereotype threat—the evaluative scrutiny and racial or gender salience that arise in many academic situations.

Evaluative Scrutiny

Perhaps the most fundamental factor associated with vulnerability to stereotype threat is the predicament of having one's ability evaluated. Tests that purportedly measure intelligence create a situation in which low performance could indicate limited ability and thus verify the stereotype (Aronson et al., 1998; Steele & Aronson, 1995). Research has shown that under such "diagnostic" conditions, stereotyped individuals' performance suffers; under "nondiagnostic" conditions when ability evaluation is downplayed, their performance improves.

The classic example of how evaluative scrutiny undermines performance involves African American students solving verbal problems on a standardized test (Steele & Aronson, 1995). In these studies, African American and white college students took a difficult verbal test resembling the GRE under one of two conditions. Participants were told either that the test measured their intellectual abilities, or alternatively, that the test measured psychological processes involved in problem solving. Results showed that in the "diagnostic" condition, white participants outscored African Americans—a performance pattern resembling the SAT racial gap. However, in the "nondiagnostic" condition, the racial gap disappeared. In other words, African Americans performed far better when the threat of evaluation was lifted.

Steele and Aronson (1995) argued that the underperformance of African Americans occurred because stereotypes change the meaning and consequences of failure. All students face the risk of shame or discouragement if they perform poorly on a task. For stereotyped individuals, however, the normal risks of low performance that anyone feels taking a test escalate. A single failure on an evaluative task can raise the troubling possibility that the stereotype is true of one's self, or that it may appear to accurately char-

acterize one's self in the eyes of others. Thus, although most people strive to do well on a diagnostic test, stereotyped individuals may become hypermotivated to perform well in order to disprove the stereotype (Aronson, 2002). This hypermotivated state appears to create an added level of stress and anxiety that inhibits the relaxed concentration optimal for high performance on complex cognitive tasks (Aronson, 2002; Osborne, 2001).

Steele and Aronson (1995) also found evidence to suggest that the diagnosticity of the exam aroused race-related and doubt-related thoughts among African Americans, presumably compounding their distraction and anxiety. In a similar study, Steele and Aronson manipulated test diagnosticity and then measured the cognitive activation of race-related constructs. African Americans in the diagnostic condition—that is, participants who thought they would have their abilities measured by an upcoming test—were more likely to be thinking about race. The specter of ability evaluation thus appears to be cognitively linked to racial stereotypes.

Group Identity Salience and Identification

Another significant situational precursor to stereotype threat is group identity salience: when one's stereotyped group status is made relevant or conspicuous by features of the situation. Such would be the case if a black student were taking a test in the presence of a group of white students, or if a female were asked to solve math problems in a male-dominated classroom. Steele and Aronson (1995) examined the effects of racial salience by having African American college students in one study indicate their race on a test booklet prior to taking a test. They found that merely asking participants to indicate their race on the test booklet (as is required by many official standardized tests) caused the anxiety of black students to increase and their test scores to drop, even though the test was presented as a nondiagnostic exercise.

Evaluative situations in which someone judges another person's competencies and abilities are understandably threatening for stereotyped individuals. And, as indicated by the study described above, any performance situation, explicitly evaluative or not, can disrupt performance if a person's stereotyped group membership is expressly brought to mind (Steele & Aronson, 1995). There is mounting evidence that identity salience can disrupt performance even when it is very subtly activated (Ambady, Shih, Kim, & Pittinsky, 2001; Shih, Pittinsky, & Ambady, 1999; Wheeler & Petty, in press). For example, Shih and her colleagues (1999) found that Asian females underperformed on a math test (relative to a control group) when their female identity had been subtly primed by a previously completed questionnaire. Interestingly, in a parallel condition in which the question-

naire primed their Asian identity, females performed *better* than did the control group, presumably because the Asian stereotype facilitates math performance. Thus, making one's stereotyped group membership salient (as in the Steele and Aronson study) can turn a nonevaluative performance situation into a threatening experience for stereotyped group members. But subtle activation of a stereotype can either impair or boost performance—without any detectable emotional reaction—depending on whether the stereotype predicts strength (e.g., Asians and math) or weakness (women in math) in a domain. These rather subtle stereotype effects, sometimes referred to as "stereotype susceptibility" effects (e.g., Ambady et al., 2001), are distinct from stereotype threat effects first identified by Steele and Aronson, in that they appear not to involve anxiety. Rather, they appear to be mediated by a simpler process, wherein one behaves automatically in line with a cognitively activated image (e.g., Bargh, Chen, & Burroughs, 1996; Wheeler & Petty, in press). As such, the performance deficits associated with susceptibility effects tend to be substantially smaller and occur significantly earlier in a child's development than stereotype threat effects—most likely because their operation seems to require little more than knowledge of stereotype content.

Importantly, the role of identity salience means that stereotype threat can arise in situations just by dint of a group's composition. Inzlicht and Ben-Zeev (2000) demonstrated that females taking a math test could experience stereotype threat due to the presence of a single male in a testing situation. In their study, the experimenters manipulated the gender composition of the groups taking a diagnostic math test. The three-person groups included three females, two females and one male, or one female and two males. Results showed that when females took an evaluative test without the presence of a male, their performance remained high. When even one male was introduced into the group, females' performance was impaired, and with every additional male, females' performance deteriorated proportionately. Inzlicht and Ben-Zeev argued that the male presence increased the salience of females' gender identities, and that the salient gender identities, in turn, evoked the negative stereotype about females' mathematics competencies. Thus, situations that increase the salience of one's racial or gender identity—either subtly or blatantly—can influence performance.

Some individuals appear to be more chronically vulnerable to stereotype threat for one of two reasons. For some, gender or ethnic identity remains at the forefront of their minds in almost any situation. These are people who feel deeply attached to their racial or gender group and highly identify with that aspect of their self. Preliminary research suggests that the more one is invested in one's racial or gender identity, the more one will be burdened by negative stereotypes suggesting limited ability (Schmader,

2002). A related vulnerability factor appears to be what Pinel (1999) calls "stigma consciousness," the chronic expectation that one will be discriminated against. For some individuals, past experience with or parental warnings about prejudice can breed a persistent vigilance, a cross-situational tendency to be on the lookout for bias (e.g., Hughes & Chen, 1999). Such individuals appear more likely to underperform in stereotype threat situations—that is, when their stigmatized status is activated (Brown et al., 2001). Both of these differences, either separately or in conjunction, can intensify the experience of stereotype threat.

To summarize, any person contending with negative stereotypes could potentially experience the debilitating effects of stereotype threat. And, as research shows, vulnerability to stereotype threat is most pronounced in situations that are evaluative or that direct conscious attention to one's stereotyped status. Importantly, these two conditions—evaluative scrutiny and identity salience—are characteristic of most testing environments in which adolescents find themselves, especially in high stakes situations such as Advanced Placement examinations, the SAT, the GRE, and so on. One's performance on these tests can have important implications for one's future in terms of college credit, scholarships, and school admissions. Furthermore, group salience is endemic to the testing situation, not only because students often indicate their race and gender prior to taking the test, but also because minority and female students take the tests in the presence of white students and males. It is these tests—those that hold the key to future opportunity—that not only show the greatest gaps in achievement between stereotyped and nonstereotyped students, but also contain the very variables so strongly related to stereotype threat, evaluative scrutiny, and identity salience.

THE DEVELOPMENT OF STEREOTYPE VULNERABILITY

That stereotype threat can affect academic achievement in late adolescence is clear. As researchers continue to study the phenomenon, they have gained greater understanding of the personal and situational factors that moderate stereotype threat, the processes that mediate it, and some useful tactics for reducing its impact on performance and engagement (see Aronson, 2002). This knowledge can serve as a useful guide in thinking about the development of stereotype vulnerability in younger adolescents, something that researchers have only begun to examine. When and under what conditions will young adolescents experience extra anxiety on evaluative tasks as a function of their stereotyped-group membership? It seems reasonable to assume that children must achieve a certain level of developmental maturity to be meaningfully affected by stereotypes about

their group. Current knowledge suggests the following as necessary conditions: awareness of ethnic stereotyping, a sufficiently developed ethnic or gender identity, a well-formed conception of academic ability, and the cognitive skill necessary to consider and fully comprehend the implications that negative stereotypes have. The developmental literatures devoted to these constructs suggests the ages of 11 or 12 as a reasonable period to expect to see stereotype vulnerability in children, to see explicit evaluation of ability result in extra stress and apprehension among members of groups alleged to lack some intellectual ability.

The Development of Sex Stereotyping in Children

Stereotype Knowledge

The developmental literature on sex stereotyping in children suggests that children exhibit knowledge of gender stereotypes at a very early age. By the age of 2, children reliably discriminate between boys and girls (Huston, 1987). As their awareness of separate genders forms, so too does their gender-related knowledge and attitudes. For example, some research shows children expressing knowledge of sex-related stereotypes as early as 2 years old and, as children mature, their stereotype knowledge increases, plateauing by Grade 4, when their gender stereotypes resemble those of adults (Nadelman, 1974; Reiss & Wright, 1982; Ruble & Martin, 1998; Williams, Bennett, & Best, 1975).

Sex Stereotyping

Children also are able to apply stereotype knowledge at an early age. As preschool children grow and develop, their thinking about boys and girls becomes increasingly influenced by gender stereotypes (Signorella, Bigler, & Liben, 1993). For example, by age 5 or 6, both boys and girls make stereotype-consistent associations between personality traits and a doll's gender (Albert & Porter, 1983), and they judge boys and men as taller than girls and women (Biernat, 1993). Children at this age also express vocational aspirations rigidly aligned with societal sex stereotypes (Garrett, Ein, & Tremaine, 1977). During the elementary school years, however, gender stereotypes begin to become more flexibly applied in that older children make less stereotypical judgments than do younger children (Signorella et al., 1993). In sum, young children develop knowledge of gender stereotypes and, through ages 8 or 9, rigidly apply them. Although sex stereotyping plateaus and begins to become more flexible between the ages of 9 and 11, adolescence heralds an increase in social pressures to behave in gender-stereotypic ways (Alfieri, Ruble, & Higgins, 1996; Crouter, Manke, & McHale, 1995; Huston & Alvarez, 1990; Katz & Kaananak, 1994).

Sex Stereotyping of Academic Abilities

Much of the research on sex stereotyping focuses on vocational beliefs (such as whether girls can be a firefighter versus a nurse), physical differences (such as height), and personality traits (such as aggressive or passive). Some sex stereotypes, however, refer more specifically to academic domains such as science and mathematics. Do these stereotypes develop in a fashion similar to the development of stereotypes about personality traits? Are children's stereotypic beliefs about math and science related to their achievement in those domains? There is some evidence that as early as age 6, math performance appears to be more relevant to the self-concept of boys than of girls (Entwisle, Alexander, Cardigan, & Pallas, 1987). Moreover, girls at this early age begin to believe that boys are better at math (Lummis & Stevenson, 1990). This early endorsement of the gender stereotype gathers force as students progress through schooling; by age 11, boys are more likely than are girls to see science as suitable for boys but not girls (Kelly & Smail, 1986) and to see math as a male domain (Fennema & Sherman, 1977).

These stereotypic beliefs have some consequences for performance, though the research often is contradictory. Although simple knowledge of sex stereotypes in general is not associated with performance on a spatial test for children in Grades 5 through 7 (Nash, 1975), endorsement of the math and science stereotype is. There is, moreover, some evidence to suggest that "sex-typed" girls, whose personalities, preferences, or behaviors resemble the traditional gender stereotype, perform less well on tests of science knowledge, spatial visualization, and mechanical reasoning, even after controlling for prior ability (Dwyer, 1974; Kelly & Smail, 1986). Conversely, girls who see themselves as more masculine perform better on spatial tasks (Nash, 1975). Thus, some research suggests that girls who endorse gender stereotypes about academic abilities or behave in stereotypical ways also perform less well on math and science tasks. Other research finds that endorsement of the gender stereotype does not affect math achievement, that girls' perception of math as a male domain is not strongly associated with math achievement (Sherman & Fennema, 1978). Thus, the picture is far from clear, pointing to a need for more research on gender stereotyping and mathematics-related performance among girls.

The Development of Racial Stereotyping in Children

The developmental literature paints a similar picture of racial stereotyping. Aboud's (1988) review of over 20 years of research in the field concludes that children demonstrate ethnic and racial awareness as young as 3 to 4 years of age. Furthermore, this work suggests that as children become aware of group differences, social attitudes begin to form about members of different ethnic groups.

Racial and ethnic awareness. Research findings show that children are able to identify people of different races at a very early age, usually between ages 3 and 5 (Aboud, 1988; Hirschfeld, 1996), and begin to accurately identify their own ethnicity as well (Aboud, 1988). This ethnic awareness increases from ages 4 to 6 or 7, at which time white children become almost 100% accurate at identifying their own ethnicity. Although slightly fewer black and Hispanic children can accurately identify their own ethnicity at age 4, these students also reach almost 100% accuracy in their ethnic self-awareness by the age of 6 or 7. Although almost all children can accurately identify their own and other's race by age 6, the concept of ethnic constancy does not develop until the ages of 8 or 9. For example, before this time, many children believe that one can easily change one's race through exposure to sunlight or even by changing one's clothes. It is not until around the ages of 8 or 9 that children become aware that ethnicity is a more internal, stable construct (Aboud, 1988). Although children become aware of skin color at a very young age, they do not yet understand that it will place them in a particular racial group (Semaj, 1985).

Racial and ethnic stereotyping. At the same time that ethnic awareness begins to develop, children begin to acquire attitudes toward their own and other racial groups (Aboud, 1988). For example, by the age of 3, white children display negative attitudes toward black children. These initial prejudicial attitudes become considerably more prevalent among 4 year olds and continue to increase through age 7. Negative attitudes toward black children are typically expressed as the black child being judged as "bad," as having negative qualities, or as being rated as the least preferred classmate. In addition to the negative attitudes they express toward other ethnic groups, white children also show a very strong preference for their own group from a very early age—around the age of 3 or 4.

Black and Hispanic students demonstrate ethnic awareness and attitudes by about the same age as do white students—around age 4 (Asher & Allen, 1969; Kircher & Furby, 1971). However, whereas white students exhibit bias toward other ethnic groups and a preference for their own group by the age of 3 or 4, the pattern of in-group attachment and out-group rejection is not found in black and Hispanic students until age 7 (Aboud, 1988). Until that time, many black and Hispanic students are initially more negative to their own ethnic group.

In addition, children at a very young age exhibit knowledge of racial stereotypes. For example, children as young as 5 years old are more likely to associate negative adjectives with pictures of black children and positive adjectives with pictures of white children (Augoustinos & Rosewarne, 2001). Around age 7 or 8, however, a fundamental shift occurs in both white and black students' ethnic attitudes, but not necessarily in their stereotype awareness. For example, children exhibit a decline in prejudicial

attitudes, yet their knowledge of stereotypes remains high (Aboud, 1988; Augoustinos & Rosewarne, 2001).

Furthermore, the negative attitudes that white children express about other ethnic groups declines between the ages of 8 and 12, while at the same time the strong preference initially exhibited by white children for their own group begins to decrease. Although white children at this time continue to prefer their own group, the strength of this in-group attachment diminishes and at the same time, they become more positive toward other groups (Aboud & Mitchell, 1977). This trend continues through adolescence (Kalin, 1979). For black children, the negative attitudes initially expressed toward their own group begin to decrease around age 8. Furthermore, this in-group attachment that eventually develops does not moderate later in adolescence as it does with white children (Cross, 1980).

Aboud (1988) argues that the shift in attitudes evident around age 7 or 8 is attributable, in part, to the growth of cognitive flexibility and skill. However, the early bias exhibited by white children supports the notion that stereotypical attitudes and prejudice are rooted in children's memories even before they have the cognitive capacity to question them (Allport, 1954; Katz, 1976). It is not until children reach early adolescence that they become aware that racial and ethnic differences are linked to such things as social class and allocation of resources (Quintana, 1996). During late middle childhood and early adolescence, children begin to develop a more sophisticated understanding of social categories and to view them as meaningful constructs. This research is useful in helping us understand the age at which children become aware of racial groups and begin to form attitudes toward those groups, both of which may be important precursors to children's vulnerability to stereotype threat.

Identity Development

It is also important to consider developmental changes in how students think about their sense of self. Specifically, what significance does a child ascribe to being male or female, to being black or white? Although children may be aware of their sex and race at an early age, these constructs do not become an integrated part of their social identity until adolescence. As Tajfel and Turner's (1979, 1986) social identity theory contends, a person must internalize an identity and incorporate that identity into the self before significant hedonic consequences of group membership are felt. Applying this theory, simply being aware of one's racial or gender group membership should not predict vulnerability to stereotype threat. Similarly, the expression of stereotypical attitudes may not necessarily predict vulnerability, perhaps because early expressions of stereotypes may simply

be a reflection of the prevalence of these stereotypes in society. Instead, a meaningful conception of one's identity that is integrated and coherent must be developed before stereotypes about one's group membership become capable of eliciting the anxiety associated with stereotype threat. Thus, researchers should consider the consequences of the development of one's social identity when investigating the age at which stereotype threat develops.

Prior to adolescence, one's identity is composed of disjointed pieces that have not been integrated (Harter, 1997). Not until adolescence does one have the mental capacity to integrate the various aspects that make up one's self and achieve a coherent sense of identity (Erikson, 1968; Livesley & Bromley, 1973). According to Erikson (1968), people enter a crisis of identity versus identity diffusion during adolescence. During this crisis, adolescents reflect on their place in society and on the ways that others view them. Because resolution of this conflict hinges on the adolescents' interactions with significant others and the reactions that others have to their actions, adolescents are more likely to be aware of other people's impressions of them (Elkind, 1967). Through the exploration of various behaviors, coupled with an increased awareness of and reflection on the consequences of those behaviors, adolescents develop a sense of who they are and what attributes they possess (Livesley & Bromley, 1973). Thus, identity formation is both a mental and a social process, resulting in the organization and integration of different aspects of their self-image into a logical, coherent whole (Harter, 1990; Marsh, 1989).

The development of ethnic identities is similar to identity development in general (Cross, 1978; Phinney, 1990). Adolescents move from a period of unquestioning acceptance of self to a crisis stage in which they attempt to understand their place within their racial or ethnic culture. Once the crisis has been resolved, individuals may experience a period of immersion in their ethnic group, preferring to associate predominantly with members of their own group and rejecting the white majority culture. Eventually, a coherent sense of personal identity emerges that includes an integrated sense of ethnic identity. Full integration of one's sense of ethnic identity with one's sense of personal identity typically occurs in late adolescence, although the process most likely begins earlier.

Gender is a critical component of one's social identity from an early age. Strong gender stereotypes prevail from childhood to adulthood and these stereotypes influence the development of one's gender identity early on. For example, although gender stereotypes become more flexible in adolescence, social forces pressure adolescents to behave in more gender-stereotypical terms (Alfieri et al., 1996).

Considering the developmental trends in gender and ethnic stereotyping, children could be vulnerable to stereotype threat as early as elemen-

tary school. As discussed previously, elementary school children have extensive knowledge of stereotypes and may actually buy into their negative messages. But although simple knowledge of stereotypes may be sufficient to influence performance via stereotype susceptibility, it does not appear to be the case that children experience stereotype-induced performance anxiety. As findings on identity formation suggest, for example, elementary school children may not have formed the coherent sense of self that is necessary for stereotypes to become personally meaningful. Thus, elementary school may be too early a time to anticipate the emergence of stereotype threat. Alternatively, the research on identity formation suggests that students may not be vulnerable to stereotype threat until adolescence. Theories of identity development imply that it is during adolescence that people become more aware of and attend more fully to others' impressions of them (Elkind, 1967). Because of this heightened concern about what others think that emerges in early adolescence, we believe that children at early adolescence may be more susceptible to stereotype threat than younger children.

The Development of Ability Conceptions

Because the problematic stereotypes refer specifically to cognitive abilities, it is reasonable to assume that children must develop a meaningful conception of ability to be bothered by the stereotype's ability-impugning messages. It is likely that they also must develop more advanced cognitive skills in order to process the social implications of the stereotype. As with the development of sex-stereotyping, children's conceptions about ability follow a developmental pattern. Ability conceptions develop throughout childhood, and, as Dweck (2002) argues, coalesce around Grade 5 into a meaningful framework that affects students' achievement motivation. In general, young children do not seem to have a coherent conception of ability. For example, young children maintain high perceptions of their competence despite actual performance (Stipek & Hoffman, 1980a, 1980b). Moreover, they are relatively unaffected by failure feedback. For example, after receiving failure feedback on a task, young children maintain high expectations for future achievement (Parsons & Ruble, 1972, 1977). Thus, young children appear to be blissfully resilient to the negative expectations that low performance often evokes. As children progress through school, however, this changes. Self-ratings of ability decline markedly—perhaps a reflection of their more accurate self-assessments (Stipek & Hoffman, 1980a, 1980b)—and they become increasingly responsive to failure and negative feedback (Eccles, 1984). Furthermore, perceptions of ability begin to become increasingly global and stable (Dweck & Elliott,

1983; Pomerantz & Ruble, 1997; Rholes & Ruble, 1984). For example, older children who experience failure on a specific task are more likely to view the failure feedback as indicative of their overall abilities, and they are more likely to use failure feedback as a predictor of their future success. An important change in ability conceptions occurs for 7- to 8-year-olds. Here, children's definitions of ability take shape and begin to influence the way they use ability information (Dweck, 2002). In the early years, although children do not infer future ability from current performance levels (Parsons & Ruble, 1972, 1977), they do associate ability with global ideas of goodness and badness. For example, they tend to associate success on a task with being a "good child" and failure with being a "bad child." By the time they are age 7 or 8, they begin to distinguish ability from social-moral qualities (Stipek & Daniels, 1990). Furthermore, at these ages, children change their ability definitions from more personal and mastery to more normative and based on social comparison (Frey & Ruble, 1985). That is, they rely more on social comparison information—on how well their peers are doing—to infer their own ability, and they begin to define smartness as outperforming others (see Ruble, Boggiano, Feldman, & Loebl, 1980.

Children's changing definitions of ability also affect the way they use information regarding their abilities. For example, they are more likely than are younger children to use success and failure feedback to assess their ability (Frey & Ruble, 1985; Ruble, 1987). In addition, 7- to 8-year-olds become less positive yet more accurate about their abilities (Wigfield & Eccles, 2000). This decline in unrealistic optimism may be due to their increased sensitivity to performance feedback. These changes continue until children become age 10 or 12, at which point they continue the trend of lower self-ratings of ability, higher accuracy in rating ability, and higher belief in the predictive power of performance feedback (Benenson & Dweck, 1986; Cain & Dweck, 1989; Nicholls & Miller, 1984; Ruble et al., 1980). Moreover, children at this time increasingly believe in ability as a stable trait and less in the effectiveness of effort to increase ability (Dweck & Sorich, 1999). Furthermore, these effort beliefs in turn begin to affect ability conceptions. For example, children age 10 to 12 are more likely than are younger children to agree that, given equal performance, less effort implies higher ability (Nicholls & Miller, 1984; Pomerantz & Ruble, 1997).

Although at first glance it may appear that ability conceptions do not change much between childhood and early adolescence, significant differences do exist. Most importantly, 10- to 12-year-olds exhibit a greater coherence of ability beliefs than do younger children, for whom ability conceptions appear to be a series of isolated beliefs with little relation to one another (Dweck, 2002). By the time children reach early adolescence, ability beliefs begin to affect other aspects of achievement. For example,

whereas young children who admit they are poor at something will not devalue the task, early adolescents begin to devalue domains in which they have low perceived competence (Wigfield, Eccles, Yoon, & Harold, 1997).

For children at this stage, moreover, competence perceptions begin to predict attributions for success and failure. Children with high perceived competence tend to attribute their successes to high ability rather than luck or effort, and their failures to bad luck rather than low ability (Nicholls, 1979). Furthermore, older children's perceptions of ability as a relatively stable trait begin to predict a host of maladaptive beliefs. In particular, students at this age who believe that intelligence is a fixed trait also tend to believe that high effort implies low ability and that effort is an ineffective route to increased ability (Dweck & Sorich, 1999). In general, a stable view of intelligence relates to a belief system focused on traits rather than on effort. Although some young children may adopt a fixed view of intelligence, this perspective does not predict impairment in the face of failure until early adolescence (Cain & Dweck, 1995; Pomerantz & Ruble, 1997).

In addition to their changing ability conceptions, early adolescents also are increasingly concerned with self-evaluation (Butler, 1989a, 1989b; Ruble & Flett, 1988) and increasingly use peer progress inquiries as a method of social comparison (Frey & Ruble, 1985; Pomerantz, Ruble, Frey, & Greulich, 1995). For example, although young students recognize that inquiring about their peers' progress can provide social comparison information, they do not engage in these behaviors until around Grade 5. By the fifth grade, approximately 80% of students report engaging in this type of behavior, whereas fourth graders seldom make these types of inquiries, despite their earlier awareness of its utility for social comparison purposes (Pomerantz et al., 1995).

Social-Cognitive and Metacognitive Development

Another important factor in predicting when children may become vulnerable to negative stereotypes is the developmental change in social-cognitive and metacognitive capabilities that occurs during adolescence. Prior to adolescence, children lack the cognitive skills necessary to think abstractly or to reflect on their own thinking—skills that may be necessary for negative stereotypes to be meaningfully disruptive to performance.

Compared to younger children, adolescents are more able to think about possibilities, to think about abstract concepts, and to think about thinking (Elkind, 1974; Flavell, 1977; Inhelder & Piaget, 1958; Piaget, 1972). For example, whereas young children's thinking is limited to concrete events, adolescents are more capable not only of generating alternative possibilities but also of reasoning systematically about the

consequences of different events. Facility with hypothetical thinking and thinking about abstract concepts also increases during adolescence, which permits adolescents to apply advanced reasoning and logical processes to social and ideological issues (Flavell, 1977). In other words, they are more able to engage in "social cognition." In addition, adolescents are more capable than younger children of thinking about their own thinking—to engage in metacognition. For example, they are more introspective, in that they think more about their own emotions, and they are more self-conscious in that they think more about what others think about them (Livesly & Bromley, 1973). It is during adolescence that people develop an increased concern for the "imaginary audience," the heightened sense of self-consciousness that one's behavior is the focus of everyone's concern and attention (Elkind, 1967; Goossens, Seiffge-Krenke, & Marcoen, 1992; Quadrel, Fischoff, & Davis, 1993).

These gains in social-cognitive and metacognitive abilities confer numerous benefits. Compared to younger children, adolescents are more able to understand abstract math problems such as the Pythagorean theorem, to play devil's advocate in a discussion, and to understand higher-order abstract constructs such as puns, metaphors, and proverbs. But the increased facility in these cognitive skills also carries some negative consequences. The increased ability to think about an abstract concept, such as a stereotype, implies that adolescents develop a greater understanding that stereotypes, and people's perceptions of them based on these stereotypes, may have meaningful implications in their own personal lives. Furthermore, adolescents' greater ability to think hypothetically sets the stage for them to worry about possible consequences of their behaviors. They are more capable of envisioning consequences of poor academic performance. Consequently, some children pay a price for the increased cognitive abilities that develop during adolescence. Although beneficial in many ways, these abilities may set the stage for stereotype vulnerability because they enable an understanding of a stereotype's meaning, hypothesizing about consequences of their behavior, and concerns about what other people think.

RESEARCH EVIDENCE

The confluence of these developmental factors map quite consistently onto the achievement literature. Early adolescence is precisely when girls begin to lose ground in math performance and when ethnic minorities experience increased decrements in academic achievement (e.g., Eccles et al., 1993; Eccles, Lord, & Midgley, 1991; Harter, Whitesell, & Kowalski, 1992; Rosenberg, 1986; Simmons & Blyth, 1987). Our own recent research

suggests that stereotype threat may play a role in this pattern of underperformance. For example, employing the evaluative scrutiny paradigm pioneered by Steele and Aronson (1995), Good and Aronson (2002) tested students from Grades 4 through 6. Results were remarkably clear. On a test comparing girls' and boys' standardized test performance, evaluative scrutiny had no discernable effect on performance until Grade 6, at which it resulted in significantly lower math performance among the girls relative to the boys. There was no corresponding difference in reading performance. Because no differences were found on girls' reading test performance under evaluative versus nonevaluative conditions, the differences found on the math test likely resulted from stereotype threat and not a general evaluation threat. Interestingly, this corresponded precisely to girls' questionnaire ratings indicating worry about their future math performance; they indicated no worries prior to Grade 6.

An additional study revealed another dimension to this vulnerability. Students in Grades 4, 5, and 6 took grade-appropriate math and reading tests under stereotype threat or nonthreat conditions. Before they took the tests, however, they were told that they would be taking a second test of both math and reading, but on this second test, they would get to choose the difficulty level of the problems. We then offered them a choice of five different problem-difficulty levels for reading and math. The difficulty levels included very easy, kind of easy, right at their level, kind of hard, or very hard. Results showed a clear effect of the stereotype threat manipulation for sixth-grade girls: under the stereotype threat condition, they selected easier problems than did the boys. Under nonevaluative (no stereotype threat) conditions, girls chose more difficult problems than did boys. And, as in the previous study, there was no difference between boys and girls on the verbal problems or prior to Grade 6.[1]

This last study suggests that one strategy students use to cope with stereotype threat may be to arrange things to avoid or reduce the risk of confirming the stereotype. When there is a clear choice between easy tasks with a high probability of success and more difficult tasks with a greater chance of failure, stereotype threat may lead people to play it safe and avoid the challenge. Because challenge is required for intellectual growth and for developing the skills and abilities needed for future success, evaluative settings may actually impede *learning*—not just their performances—of stereotyped individuals. The accumulated effect of years of reduced opportunities to strengthen and grow one's capabilities may eventually lead to the very differences in performance to which the stereotype refers. We replicated this study with Latino and white students taking a verbal test and choosing the difficulty level of verbal tasks under threat or no-threat conditions. The results paralleled those found for girls in math: under evaluative

scrutiny, Latino students selected easier tasks. As with the girls, this pattern emerged only among the Grade 6 students.

Other researchers have found what appear to be stereotype threat effects in children at levels lower than Grade 6, though in substantially different contexts. For example, McKown and Weinstein (2000) investigated stereotype threat in minority children (African Americans and Latinos) between the ages of 6 and 11. They found that the most important predictor of children's vulnerability to stereotype threat was not their age, but their ability to report their awareness of stereotypes operating in the real world. To measure this ability, the researchers told the children a story about an imaginary land comprised of two groups of people, Greens and Blues. Children are told that in this land Greens think Blues are not smart. Then the researchers asked the children to describe any similarities between the imaginary land and the real world. The children's responses—the number of similarities each reported—comprised the measure of their ability to report stereotypes. After this measure, the children participated in a stereotype threat experiment in which they wrote the alphabet backward in 45 seconds under either diagnostic or nondiagnostic conditions. In the diagnostic condition, they were told that the task would show how good they were at different types of school problems. Thus the task purportedly measured general academic ability.

Results of the study showed that, among students who were developmentally advanced enough to draw parallels between the stereotypes in the story and those in real life, evaluative scrutiny undermined minority students' performance. In the diagnostic condition, white students outperformed minority students; however, in the nondiagnostic condition, the performance pattern reversed and minority students outperformed white students, even when controlling for prior ability. Students who could not report stereotypes did not exhibit evidence of stereotype threat. Because the researchers did not analyze the data by age, no conclusions can be drawn about the age at which stereotype threat undermines performance. The researchers argued, however, and we agree, that the ability to understand how intelligence stereotypes can be used against people in the world is a more valid predictor of stereotype threat than age alone. They added that children who report stereotypes are vulnerable to stereotype threat because they are developmentally advanced enough not only to be aware of stereotypes—which occurs very early in children (Aboud, 1988)—but also to attend to and care about the meaning of stereotypes about their group. Still, it is not altogether clear from this intriguing research what was being tapped by McKown and Weinstein's measure of stereotype vulnerability.

A study by Ambady and colleagues (2001) suggests that stereotypes can influence cognitive performance even earlier than our discussion suggests.

In their experiments, Asian American girls between kindergarten and Grade 8 completed a stereotype activation task designed to evoke either their gender identity or their ethnic identity. A control group also participated but did not respond to any manipulations making their gender or ethnic identity salient. The younger participants (kindergarten through Grade 2) either colored a picture of a girl holding a doll or of two Chinese people eating with chopsticks. The older participants (Grades 3 through 8) either answered gender-related questions or ethnicity-related questions. Participants then took a difficult math test appropriate for their grade level.

Results from this study show an interesting pattern of stereotype susceptibility that depends on grade level. Girls in the early elementary (Grades K through 2) and middle school (Grades 6 through 8) had the highest accuracy on the math test when their ethnic identity was made salient and the lowest accuracy when their gender identity was made salient. Interestingly, girls in upper elementary (Grades 3 through 5) showed the reverse pattern: girls were more accurate when their gender identity was made salient than when their ethnic identity was made salient. It is instructive to note that these experiments find very small differences in actual test performance, presumably because the subtle activation of stereotypes tends not to arouse anxiety. Thus, although they demonstrate that knowledge of stereotype content can influence performance—either positively or negatively—the process is quite distinct from the typical stereotype threat finding, which involves measurable apprehensiveness and a desire to disprove the stereotype rather than an "automaticity" effect (see Wheeler & Petty, in press, for a discussion). Indeed, as a recent study with college students demonstrated, if one makes the connection between the identity and the performance explicit rather than implicit, the process changes—either identity (Asian or female) induces performance pressure and undermines performance (Cheryan & Bodenhausen, 2000). Thus, the Ambady and colleagues (2001) research appears not to involve threat. In our own research (Good & Aronson, 2002), explicitly making gender or ethnicity salient shows no evidence of affecting performance until Grade 6. We believe that some critical factors—such as those we have discussed—need to develop for ability evaluation or identity salience to induce anxiety among girls and minorities, and, for most children, these do not develop before early adolescence.

Interestingly, although identification with the stereotyped domain is an important predictor of older adolescents' vulnerability to stereotype threat (see Aronson et al., 1999), researchers have not yet demonstrated a clear relationship between academic identification and vulnerability to stereotype threat in younger children. Because the participants in Good and Aronson (2002) all strongly identified with academics in general and with math achievement, they could not investigate whether children with low

academic identification were vulnerable to stereotype threat. To date, researchers have not measured children's identification with academics and used it to predict stereotype vulnerability. Because of the importance of this variable in older adolescents' vulnerability to stereotype threat, there is clearly a need for more research investigating the relationship between domain identification and stereotype vulnerability in children and young adolescents. Yet it is important to note that, although students who are highly identified with academics show the most vulnerability to stereotype threat, this relationship has only been revealed in laboratory conditions—a decidedly low stakes situation for all but the most identified with academics. Clearly there are situations in which less serious students may be vulnerable to underperformance (see Aronson et al., 1999).

The Changing Academic Context

We believe that by the time children reach early adolescence they are developmentally ready to experience stereotype threat. The transition to middle and junior high school capitalizes on this readiness, producing what we believe are significant manifestations of stereotype threat—a significant decline for many students, particularly girls in math and minority students more generally. Several studies tend to report significantly more problems—suspensions, low academic performance, conflicts with parents, and so on—among black and Latino students than among white students making the transition to junior high, or from one school to another (e.g., Felner, Primavera, & Cauce, 1981; Simmons, Black, & Zhou, 1991). Why might this be? One possible reason is the "stereotype climate" that we hypothesize is engendered and reinforced by the middle school setting and the developmental stage in question. The transition confronts many students who attend public schools with the most intensive—if not the first—contact with youngsters from diverse ethnic backgrounds. In most cases, this will not be the "equal status" contact considered essential to minimizing prejudice. Rather, black and Latino children, because they tend to come from poorer school districts, are likely to be academically behind their white counterparts by as much as two grade levels (Gerard, 1983). Such preexisting differences may be underscored by the "ability grouping" (e.g., "tracking") prevalent in many middle and junior high schools (Eccles et al., 1993), which tends to racially stratify the classrooms (Romo & Falbo, 1995). Furthermore, the middle school or junior high setting is likely to be more competitive than the grade school setting (Harter et al., 1992), which may further encourage overt and covert racial stereotyping (Aronson & Patnoe, 1997). Thus, the existing stereotypes (e.g., "Blacks are not as smart

as whites") may be confirmed and intensified by the type of contact afforded by the middle school or junior high structure.

Students' vulnerability to the stereotype climate may be magnified by the fact that, relative to those of grade school, middle and junior high school contexts tend to place a higher premium on social comparison. Peers and peer evaluations become powerful influences, making "fitting in" a high priority (e.g., Harter, 1990; Spencer & Dornbusch, 1990). Because stereotype threat stems to a great extent from concern about how one is viewed by others (e.g., peers, teachers), it seems reasonable to assume that the threat may be particularly acute, and, at this stage of development, particularly damaging to the formation of a healthy academic self-image. Eccles and her colleagues (see Eccles et al., 1991, 1993) have argued that the classroom environment in junior high school is much different than that in elementary school and that this change in environment may cause difficulty for some students. Middle school and junior high classrooms are often larger and more impersonal than elementary school classrooms. Furthermore, Midgley, Berman, and Hicks (1995) argued that junior high teachers hold different beliefs about students than do elementary school teachers. For example, junior high teachers are less likely to trust their students and more likely to emphasize control and discipline in their classrooms. More importantly, junior high teachers are more likely to believe that their students' abilities are fixed and less likely to believe that students can increase their abilities through instruction. And, as research is beginning to show, teachers who believe in fixed versus acquirable ability differ in their pedagogical theories and practices. For example, teachers who see abilities as fixed tend to judge students' abilities by comparing them to those of other students rather than by observing personal improvement (Butler, 2000; Lee, 1996; Plaks, Stroessner, Dweck, & Sherman, 2001). These different methods of evaluation have important implications, for it has been found that students of math teachers who emphasize normative evaluation rather than individual progress over time (in line with fixed ability perspective) come to value math less over time (Anderman, Eccles, Yoon, Roeser, Wigfield, & Blumenfeld, 2001). Moreover, as will be discussed in the next section, stereotype threat is exacerbated for students performing in a fixed-ability context; that is when they believe that the abilities that are being evaluated are thought not to be expandable (see Aronson, 2002). Because adolescence is the period during which students become more sophisticated in their understanding of societal stereotypes, the fixed ability beliefs held by junior high teachers may be particularly disruptive for minority students and for females in math and science. This confluence of developmental and structural factors suggests that even if black, Latino, and female students graduate from elementary school feel-

ing competent and enjoying school as much as their counterparts, they may become demoralized not long after entering.

Reducing Stereotype Threat: The Role of Implicit Theories of Intelligence

How can the impact of stereotype threat be reduced during the storm and stress of adolescence and the transition to stereotype threatening schooling contexts? In addition to studying factors involved in evoking a stereotype threat response, researchers have been investigating factors that protect people from stereotype threat's debilitating effects. One obvious approach would be to change the existing stereotypes themselves, or to construct educational or testing situations such that evaluation or the salience of race or gender is minimal. Unfortunately, such approaches are rarely feasible. First, as much research has shown, stereotypes doggedly resist change. And reducing evaluation and racial salience are, almost by definition, impossible in integrated testing centers or classrooms. Instead, recent stereotype threat research has focused on more realistic approaches, capitalizing on lessons learned from research in achievement motivation. In particular, Dweck and her colleagues (e.g., Dweck, 1986, 1999; Dweck & Leggett, 1988; Hong, Chiu, & Dweck, 1995) have shown that students' beliefs about intelligence strongly affect their achievement motivation.

This research suggests that people's implicit theories about the nature of intelligence—as a fixed, stable trait (entity theory), or as something that increases with effort (incremental theory)—have important consequences for their academic achievement. And what the research consistently shows is that students with an incremental view of intelligence fare better than their entity-view counterparts, especially in the face of difficulty. For example, researchers have reported that students with an entity view of intelligence persist less in the face of challenge, view failures as indicative of future abilities, avoid challenging tasks, and believe effort to be an ineffective strategy for success. Their goal is to perform at a level that marks them as smart, capable students; thus, they prefer unchallenging tasks—those that ensure high performance. In contrast, incremental theorists persist longer when challenged, view failure as a signal to increase effort, and recognize challenging tasks as the route to increased knowledge. Their goal is to learn and increase their intelligence; thus, they prefer challenging tasks that increase their current understanding. Consequently, students' implicit theories of intelligence greatly influence academic achievement. How do implicit theories of intelligence relate to stereotype threat? Aronson, Freid, and Good (2002) reasoned that stereotyped individuals may find them-

selves in the same mindset as people who hold an entity view of intelligence, especially when faced with academic difficulty or the possibility of low performance. The very nature of the stereotype itself suggests that individuals, *by virtue of their group membership*, are inherently limited in their abilities. Thus, stereotyped individuals not only must contend with the expectation of low performance but also the suggestion that their abilities are fixed. The stereotype, with its implication of inborn and fixed traits, imposes an entity framework upon achievement situations. Consequently, stereotyped individuals may, at least temporarily, adopt an entity mindset, complete with all the trademark responses of entity thinking. If, however, stereotyped individuals can maintain an incremental mindset when faced with challenging academic tasks, perhaps they will be less vulnerable to the threat of ability-impugning stereotypes.

Recent laboratory and field research supports this reasoning. In one laboratory study, students' conceptions of ability as fixed versus expandable were manipulated to investigate the effects on subsequent test anxiety and performance (see Aronson, 2002). Participants (African American and white college students) took a challenging verbal test. One-third of the participants were told that the abilities being tested were highly expandable, one-third were told that the ability was fixed, and one-third simply were told that the test measured verbal ability. In the fixed ability condition, participants solved fewer items and reported more anxiety than participants in the control condition. When participants were led to believe that the ability being tested was malleable, they solved more items and reported less anxiety. These effects held for both the white and black participants. In the control group, performance correlated to the test-takers' own views of intellectual ability measured prior to the test: the more malleable they thought it was, the better their performance on the test.

In a recent field study, researchers wanted to see if encouraging an incremental theory of intelligence would affect students' academic engagement and achievement outside the laboratory (Aronson et al., 2002). Three groups of African American and white undergraduates participated in the study. One group participated in an intervention that used various attitude-change techniques designed to teach them, help them internalize, and make cognitively available the notion that intelligence is expandable (malleable condition). The attitudes and achievement outcomes for this group were compared to those of two control groups—one that participated in the same intervention with a different intelligence orientation, and a second group that did not participate in the intervention. The results of the intervention showed that teaching African American students that intelligence is malleable created an enduring and beneficial change in their own attitudes about intelligence. Furthermore, they reported enjoy-

ing and valuing academics more and they received higher grades than did African Americans in the other conditions.

Taken together, these studies provide clear evidence of the benefits of holding an incremental theory of intelligence—especially when faced with a stereotype suggesting limited ability. Thus, although stereotype threat undermines performance, "incrementalism" appears to provide an effective defense against its negative effects. Using this model, stereotyped individuals may protect themselves from the negative effects of stereotype threat by rejecting an entity view of intelligence and adopting an incremental view.

CONCLUSIONS

Stereotype threat is a predicament that can undermine the achievement of students from a wide range of stereotyped groups. Recently, researchers have investigated the age at which stereotypes become meaningfully disruptive to students' academic pursuits—that is, when stereotype vulnerability develops. We have learned that students are aware of and to some degree influenced by ability impugning stereotypes throughout their academic lives. However, it is not until early adolescence that children develop the cognitive abilities necessary for stereotypes to be meaningfully disruptive, that is, to arouse extra performance anxiety when abilities are under scrutiny. We believe this is the case because it is during adolescence that children begin to think about and pay greater attention to others' perceptions, because they have developed complex ways of thinking about cognitive abilities, and because of an increasing awareness and application of stereotypes. Finally, these advances in cognitive ability and coherence of self-perceptions occur in the context of junior high or middle schools, environments that appear to be breeding grounds for sensitivity to stereotype-based judgments of ability. The effects of this stereotype vulnerability appear to be compromised performance, learning, and engagement with academics. The good news is that the more that is learned about these processes, the more optimistic we are that, with wise, research-based interventions, we can help students cope with stereotype threats during this critical period in life.

NOTES

1. One might argue that boys thrive on competitive situations, and thus, their eagerness to prove themselves resulted in their higher performance under evaluative scrutiny. Is it the case that boys are really going out of

their way to outperform others or is it the case that girls' performance is greatly debilitated under the specter of evaluative scrutiny? The answer seems to be both. A closer inspection of the pattern of means in this study showed that boys' performance increased when they thought they were being evaluated. At the same time, however, girls; performance decreased under evaluative conditions. It is interesting that at the exact time in which boys get a boost from evaluation—early adolescence—girls are debilitated, but only when the evaluation occurs in a stereotyped domain. It is also important to note that although we were evaluating the students' math abilities, we did not make normative comparisons between students. Thus, these results cannot be adequately explained by the research suggesting that boys prefer normative evaluation.

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